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LABELLING OF EMOTIONS AND CROSS-MODAL CODING

BY DEAF AND HEARING CHILDREN

BY



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A THESIS

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The undersigned certify that they have read, and  
recommend to the Faculty of Graduate Studies for acceptance,  
a thesis entitled Labelling of Emotions and Cross-Modal....  
Coding by Deaf and Hearing Children.....  
.....  
submitted by Eleanor Iftody in partial fulfilment of the  
requirements for the degree of Master of Education.



## ABSTRACT

This study was designed to investigate the ability of non-hearing and hearing subjects to label emotions and identify patterns of stimuli input in cross-modal coding tasks. The two groups selected for study were matched on raw scores on Raven's Progressive Matrices. It was hypothesized that performance by the two groups on labelling emotions and in cross-modal tasks would differ in favor of the hearing.

A sample of 34 hearing subjects in the age range of 8 to 13 years and a sample of 34 non-hearing in the age range of 9 to 15 years were employed in this study.

A film "Emergence of Personality" was used with sound for 34 Ss (hearing and non-hearing) and without sound for 8 Ss from each group who subsequently labelled emotions conveyed by the film. A second test, "Dot-Patterns", required the subjects to identify rhythmic patterns which were tapped on S's palm of the hand. This data was analyzed in terms of mean, variance, standard deviation, and the use of the sign test.

The testing of three hypotheses produced the following results:

1. There is a significant difference ( $p < .02$ ) in favor of the hearing age 8-9 and 10-11 years, as compared to the non-hearing age 10-11 and 12-13 years in response to the sound presentation of the film. There is no difference between non-hearing aged 14-15 yrs., and hearing aged 12-13 yrs.



2. There is no significant difference between the performance of the hearing and non-hearing to the silent presentation of the film, though the difference ( $p < .20$ ) appears in the expected direction, viz. in favor of the hearing.

3. In cross-modal coding tasks, there is a significant difference between the performance of the hearing and non-hearing of the age groups as above, in favor of the non-hearing. There is no significant difference when hearing and non-hearing are the same chronological age.

The results were discussed in terms of the role of reduction of cue input in the labelling emotions task and in terms of coding ability in the absence of a need for verbal labelling.



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## CHAPTER 1

### INTRODUCTION

The nature of thinking about deaf children has been changed considerably by the recent work of Fry (1966). One component of the acquisition of language of speech is the acquisition of the phonemic system. Fry points out that the acquisition of the phonemic system even in normally hearing children is essentially dependent on central nervous system processes rather than on peripheral input processes. He has shown that even with minimal auditory input, infants and very young children with serious hearing deficits can acquire the phonemic system and thus language and speech at almost the same time and rate as normally hearing children, provided the mother responds to the infants' non-hearing with increased stimulation through all non-verbal (particularly face-to-face contact) and expressive means, instead of with less. It must be pointed out that the deaf children about whom we are speaking in the present study, as well as in the review of literature, have not had the benefit of the early kind of training that Fry has pioneered.

Through the understanding of the language of others, the hearing child acquires a wealth of information. He uses language to express ideas, needs, and wants, as well as to influence the behavior of others. Many writers claim that a close relationship exists between language and thought. Vygotsky (1939) concludes that "thinking and speech are the key



for understanding the nature of human consciousness" (p.37). If this is so, then the deaf child's handicap in language and speech must have far reaching implications for his development. On the other hand Furth (1966) has warned against attributing all cognitive deficits in the deaf specifically to deficits in language.

It is the present researcher's view that language is not essential for all thinking. Language is only one method of transmitting organized, meaningful signals from one person to another. Gestures, drawing, and dancing, are other ways of expression.

Humboldt reports (1964) that there are two main media through which thought is expressed. These are the motor-gestural and the vocal-articulatory. According to Humboldt these two media for the hearing child work analogously. For example, within the motor-gestural medium, vocal-articulatory behavior emerges at the same time in such acts as reaching-to-touch, of turning-to-look. These two sequences of communication culminate in the formation of patterns. In the expression of meanings and feelings and in coding of information, the hearing child is capable of falling back on non-verbal modes of communication such as gestures, facial expressions, and touch. Consequently signs, gestures, and touch have communicative significance in the expression, identification, and labelling of emotions as well as in the coding of other information.

The sense of touch is one of the most important



sources of human consciousness, one which Lenin held to be on the same level of importance as sight. "Touch is a special form of reflection in the brain" Sechenov 1961 (cited by O'Connor, 1961).

By the genetic method Sechenov discovered the community of sight and touch in the reflection of spatial characteristics and relationships, formulating this in the well-known thesis that touch is "a sense parallel to sight." The tactual sense is one of the primary modes of orientation, of obtaining information, and of communication. While tactile communication is never wholly superseded, it is elaborated by the symbolic process. In many interpersonal relations, tactile "language" functions most effectively and communicates more fully than vocal language. The use of tactile "language" instead of vocal language could perhaps be regarded as sensory compensation. This is to say that if a child has an auditory disability, compensation of this deficit might lead to increased sensitivity in, and use of some other mode of perception, such as touch.

It was not until the turn of the century that any serious attempt was made to establish the scientific validity of sensory compensation (Davitz, 1964). In general, literature shows that researchers (Nass, 1964; Davitz, 1964) have found no superiority of the non-hearing over the hearing in senses other than the auditory. The literature, in fact, tends to show an inferiority of the non-hearing over the hearing. However, the notion is still widely held by the lay



public that non-hearing people compensate for their auditory disability by increased sensitivity in other modes of perception, particularly the visual and tactual.

It is natural to look for a development in the expression of feeling during childhood. As the age level of the child increases, changes in the dominant mode of expressing feeling appear to occur. Goodenough (1931) studied expression of feeling in young children and states that the primitive bodily responses are gradually replaced by substitute reactions which are less violent and more symbolic. Up to the age of about two or three there is a steady increase in screaming, making angry noises as a method of showing resentment. These expressions of feeling decline as soon as the capacity for self-expression in language appears.

If there are changes in the way in which the growing children express feeling, then it is reasonable to suggest that there will be changes in the way they perceive emotions; just as in expressing feeling the verbal expression of feeling takes over from the direct bodily experiences, so in the perceiving of emotions in others the verbal labelling or categorization of the emotion takes over from the direct involvement in the emotion perceived.

Since the hearing child has both the visual and the auditory media through which he can perceive emotion, while the deaf child lacks the auditory input (including e.g. the intonation, which, according to Fry, {1966}, is a cue for



affective information), we can expect the cues which they are receiving to differ, the cues being more limited for the non-hearing.

We do not know what the reduction of the cues (as a result of the absence or paucity of input from one sensory modality) does to the child's perception of the emotions. Perhaps we have an analogy here to what Fry has demonstrated about the acquisition of the phonemic system namely that even with reduced and idiosyncratic cues, the phonemic system can still be acquired. In the same way perhaps, even with reduced perceptual cues the distinctions between emotions can still be acquired just as, or almost as, accurately as when a wider range of cues is available. On the other hand the analogy may not hold. The investigation to be described gives some data on this, although the data is not sufficient to decide this issue.

Apart from the nature and the range of the cues received, there is the question of the verbal labelling of the emotion perceived. Since non-hearing children are generally retarded in language development when compared with hearing children, they are probably less able to find the right (or culturally accepted) labels for, and categorization of the emotions perceived, even though the words for the emotions may already be in their passive vocabulary. Hence the non-hearing children may remain too directly involved in the emotion perceived to be able to identify it by means of a verbal label. They may be just as "sensitive to emotional



expression in others" as hearing children, but simply less capable of labelling and categorizing them verbally. The distinction made by Werner and Kaplan (1963) between "reacting to" and "thinking about" may be relevant here.

The present investigation deals with these issues. It consists of two interrelated parts. A general indication of the outline of the research will be given here; the specifics will be dealt with in the chapters that follow.

The first part compares the verbal labelling of emotions by non-hearing and hearing children when they are shown film sequences in which emotions are expressed. The film was shown with sound to one group of non-hearing and of hearing children respectively. In the first condition, the non-hearing children may be assumed to be at a disadvantage in two respects: reduced range of cues due to lack of auditory cues, and lesser verbal ability. In the second condition only the lesser verbal ability would be to their disadvantage; in fact as far as cues are concerned, the hearing children may now be at a disadvantage, because they are less accustomed to being deprived of auditory and verbal cues. It was expected that the performance of the non-hearing in labelling the emotions correctly, would be lower for the non-hearing under both conditions, but that the difference between hearing and non-hearing would be more marked in the case of the sound film presentation. If this turned out to be the case, it would be taken to indicate that both the re-



duction in cues and deficit in ability to label and categorize the emotions were involved in the non-hearing children's inferior performance, with the deficit in the ability to label contributing under both conditions.

In order to minimize (though not eliminate) differences in verbal ability the non-hearing children tested in this part of the study were about one year older than the hearing children; it was felt that in view of the fact that the deaf children had had so much fewer years of language learning than hearing children, it would be unrealistic to compare children of the same chronological age.

The second part of the investigation compared non-hearing and hearing children on a cognitive task in which verbal labelling was not involved. The task chosen was a cross-modal task (tactual-visual), adapted from Birch's (1964) auditory-visual cross-modal coding test. Cross-modal tasks are presumed to involve some form of symbolic, though not necessarily verbal, mediation and, according to McV. Hunt (1969), are assumed to give a good indication of basic intelligence. In view of these real or presumed characteristics of cross-modal tasks (no labelling, symbolic but not necessarily verbal mediation, indication of basic intelligence) it was expected that there would be no difference between the hearing and the non-hearing Ss on the cross-modal task. If indeed no differences emerged, this would be regarded as indirect evidence that the inferior performance



of the non-hearing in the first part of the investigation lay primarily in their verbal labelling ability. As it turned out, and will be explained when considering the results, it became necessary to make two comparisons: non-hearing children with hearing children 1 to 1½ years younger, as in the first part of the investigation, and non-hearing and hearing children of the same age.



## CHAPTER II

### REVIEW OF RELATED LITERATURE

Primarily, this study is concerned with the nature of perception of hearing and non-hearing. Non-hearing children are those who are deaf from infancy and receive language experience at school age. There is little experimental evidence which directly relates to this study; however there is a good deal of early research which throws light on it and some very recent work which adds a new dimension towards the study. For the purpose of this study, the literature will be organized as follows:

1. Fry's study.

2. Differences of non-hearing and hearing children in general, demonstrating a lag in:

Social development, personality, language and cognition.

- (a) Tactile communication

- (b) Intersensory integration.

1. Fry's Study

Fry's views (1966), already referred to in the introduction, will not be reviewed in detail here, since the sample of children tested in the present investigation is in no way comparable to the deaf children who have had the benefit of the early training based on the rationale which Fry and



his associates have developed. One aspect of his rationale, however, needs to be highlighted, because it is relevant to our investigation; viz. Fry's contention that in acquiring language central nervous system processes are more important than peripheral input processes, and that there is no a priori reason to assume that the deaf child's central nervous system processes more frequently have deficits than those of normally hearing children. This is also the position taken by Lenneberg (1966).

We turn now to studies of deaf children whose language training has followed one or other of the more traditional programmes.

## 2. Differences of non-hearing in general demonstrating a lag.

There is a good deal of research which indicates a general retardation of deaf children, in that the children deaf from early infancy and not having much language experience till school age, show a lag of several years in social and personality development and in language and cognitive processes.

In accordance with this view of an existing lag, Ewing (1943) points out that the comparative isolation of the deaf child from other children, the relationship of the deaf child and his family, and the frustrations of his everyday life tend to contribute towards slower development than that of



normal children of the same age. Ewing states too that there is evidence that the child who does not hear the spoken word will not acquire auditory language. The child with deafness from infancy has a marked retardation in all aspects of language, and it is therefore necessary for the child to acquire verbal systems in some other manner.

Myklebust (1960) made a study of deaf and hearing and reports that a fundamental difference exists between the deaf and hearing as to processes involved in acquiring the first basic language. The hearing child acquires an auditory inner and receptive symbol system and uses the same channel to monitor his first expressive language. In contrast, the deaf child, whose expressive language also is speech, cannot monitor this function by using the same channel through which he acquires his inner and receptive language. His visual symbol system, and speech reading is converted into a tactual-kinesthetic system for speaking. In other words, his spoken language must be monitored through a sensory channel other than the one used to monitor his receptive language.

To further demonstrate a lag Heider and Heider (1940) point out that the deaf child usually does not begin to learn language until he reaches an age at which the hearing child already masters most of the forms used in adult expression. Heider and Heider in comparing sentence structure



of deaf and hearing children from a single composition from each child, in all comparisons except those of the infinitive and prepositional phrase, found that the performance of the deaf resembles that of less mature hearing children. They assumed the differences in the writing of the story to be that the deaf make summarising statements because their mastery of language is insufficient and they feel a need to stop and recapitulate as they go through a story. They further assumed this difference to be due to their classroom training, which requires them to give more frequent explanations so that the teachers may be sure that they understand what is given at each point. There is evidence that the deaf tend to use relatively more of the simpler forms of expression whereas the hearing use relatively more of the complicated ones.

Furth and Rosenstein (1961) indicate that deaf children are able to conceptualize and reason on nonverbal levels. In addition to the sources of errors in concept development of hearing children mentioned above, one of the greatest problems in the teaching of concepts to deaf children arises from the fact that they grasp concepts nonverbally and function without the immediate necessity for the use of verbal labels. Getting concept names to stick is virtually the only obstacle we have to overcome with the deaf child; once he has these, he has another perhaps more efficient way of



ordering his world. However, from all research reviewed, there are contradictions as to whether or not the deaf are retarded in comparison with hearing children in their language development (Rosenstein, 1961).

Rigid personality patterns are found to be common to the deaf. Bindon (1937) studied the personality of deaf children by using the Rorschach test to reduce to a minimum the language handicap of the deaf subjects. The rigid patterns found were said to be due not so much to deafness itself, as to its consequences. Like Bradway and Farmer (1967) Bindon suggests too, that the process of socialization, and hence full personality development, is hindered by the retardation of normal language development. By investigating conceptual responses of the deaf, Bindon found that these children do not reach full conceptual development because of the retardation caused by the restrictive factor of deafness. Because this prevents normal language, it seriously impedes the deaf child's progressive socialization. Hence, Bindon suggests that the deaf are functioning on a less mature level of personality integration.

Bakwin's (1937) research supports the above findings in stating that when the hearing child is experimenting with socialization and adapting to sound in its environment, the deaf child becomes gradually more quiet, less responsive to speech, and at the same time more visually attentive.



Therefore, pointing, gestures, and dramatization all have their place in the environment of the deaf child. These aid him in understanding what is going on, and play an enormous part in his socialization. It is because of isolation that language is not developed and other problems arise. He found that those who can communicate by speech and lip reading are more like the hearing on inventory-questionnaires than those who rely on writing.

Research generally shows that there is a lag in the non-hearing child's social development. A study by Nass (1964) also shows a lag in moral development.

Nass (1964) studied aspects of conscience development in deaf and hearing children. Thirty deaf children, six at each age level from 8 to 12 years, were interviewed individually by the experimenter. Children were congenitally deaf and were of average or slightly superior intelligence. Responses of the deaf children were compared with responses of 30 hearing children of comparable age, sex, and intelligence. Each child was told four stories involving moral judgments, and questions were asked concerning them.

Findings in Nass's study support more recent studies (Pettifer, 1967) which suggests that conceptual development in deaf and hearing move in a similar direction and that there is no qualitative difference between the groups. According to Nass, responses of deaf children at any given age are



characteristic of younger hearing children and do not reflect qualitative differences between deaf and hearing. In other words there is a time lag in development rather than a difference in the nature of moral judgment. Nass calls for a more detailed study of the relationship of language to the ability to understand motivation and to social maturity. He states also that it is necessary to test deaf children with sign language as well as oral language. It appears that many studies of this nature neglect to control for sign language as a relevant variable.

Gates (1927) tested children from grades three through eight using a recording of the alphabet recited to express each of nine different emotional meanings. Gates found that the ability to identify the emotional expressions is positively related to age, grade, school experience, and intelligence. As only a brief summary of Gate's study is published and the original data is no longer available, Demtorvsky (cited by Davitz, 1964) replicated the study, and sensitivity from ages 5 through 12 were examined. The data reveals that with chronological age there is general, but steadily progressive increase in sensitivity to emotional expression. These parallel what is known concerning the development of sensitivity to facial expressions of feeling; Dashiell, 1927; Gates, 1923; Kellogg & Eagleson, 1931 (cited by Davitz, 1964). The general tendency that these researchers find is that those people who have a sensory deprivation of some type, eg. blindness or deafness, lag somewhat in their ability to perceive and identify emotions,



although the blind have been shown to be superior as compared to the hearing and seeing. It seems however that none of these researchers have paid sufficient attention to the fact that the deaf or blind (the deaf particularly) could be scoring lower because of the written language response (be it to write the response or identify an already written response).

Mehrabian (1967) studied the decoding of inconsistent and consistent communication of attitude in facial and vocal channels using adults as subjects. Three degrees of attitude (i.e. positive, neutral, and negative) communicated in facial expressions were each combined with three degrees of attitude communicated vocally. A group of 25 subjects was used in the preliminary selection of a neutral word. A second group of 17 Ss was used to assess the independent effects of facial and vocal communications. A third group of 20 Ss was used to obtain the combined effects of facial-vocal communication. Results indicate that the facial and vocal component together have a stronger effect than the vocal component alone. The facial component received approximately 3 times the weight received by the vocal component.

Gates (1927), although much earlier than Mehrabian, reports similar findings, viz. that children are more accurate in their judgments of facial compared to vocal expressions of feelings. It therefore seems evident that the facial component or a combination of facial and vocal has a stronger effect than the vocal component used alone.



### 3. Tactile Communication and Exploration

#### a) Tactile Communication

"The skin is the outer boundary, or the envelope which contains the human organism and provides its earliest and most elemental mode of communication" (Frank, 1957). Frank explains that tactual sensitivity is one of the primary modes of communication. While tactile communication is never wholly superseded, it is elaborated by the symbolic process. In many interpersonal relations, tactile "language" functions most effectively and communicates more fully than vocal language.

The skin is regarded as an organ of communication, for sending and receiving messages. It is highly complex and versatile, with an immense range of functional operations and a wide repertory of responses.

Geldard, 1968 (cited by Chakravarty, 1968) investigated cutaneous communication and states that the skin acts as a receiving instrument in combining the abilities of the eye and ear. He has found that under proper conditions, the skin can detect a break of about 10 thousandths of a second in a steady mechanical pressure or tactile buzz. Comparable time discriminations for the eye are much slower. Geldard makes further comparisons and states that in terms of space, the skin can identify and distinguish between coded signals delivered from five to seven different locations within the chest area, whereas the



ear cannot identify the source of a sound.

O'Connor (1961) selected the tactile exploration of complex non-representational shapes and compared that with visual inspection and recognition. Recognition scores of normal children did not differ significantly between any of the four conditions presented in the experiment. The children recognized the figures equally well whether they were visually or manually inspected. The subnormal children showed a different pattern of results. Analysis of variance and subsequent "t" tests showed that while cross modality recognition trials did not differ from the visual-visual condition, tactile inspection and recognition resulted in a significantly better performance for the subnormal children.

Results showed the relative effectiveness of responses given in the "opposite" modality from the stimulus. The "tapping-signal, verbal-response" arrangement gave better results than the tap-tap or count-count arrangements. The cross-modality reactions seem to make a general instruction more effective, allowing greater mobility of response patterns.

Research reported by Zaporozhets (1965), with young children while they were engaged in haptic exploration of objects with their eyes closed, indicated that exploratory movements of the hand changed with age. Zaporozhets described that on first touching the object, the children tried to manipulate it (rolling, pulling, pushing), acquainting themselves with the objects in the process of practical and



playful actions. The older children of 6 to 7 years are said to have used more delicate palpating movements of the hand while tracing the contours of the object.

Piaget and Inhelder (1956) also report differences in method of haptic exploration by younger and by older children. The authors point out that the younger Ss explored the cutout shapes less actively, often limiting themselves to only parts of the figures. The older Ss explored the figures more actively, tracing the edges with their fingers.

#### b) Intersensory Integration

Researchers have hypothesized that effective intersensory organization is partially dependent upon maturation of the central nervous system. The findings of Abravanel (1968) demonstrate that from ages 3 to 14, significant changes occur in the forms of perceptual activity and in the effectiveness of such forms for producing accurate intersensory patterning.

Birch (1967) studied intersensory equivalence in the perception of geometric forms. A paired comparison technique was utilized. A form presented to one sensory system was compared with forms presented to another sensory system. Results showed that the ability to make the various intersensory judgments tended to increase with age. For judgments of both identical and nonidentical forms, the least number of errors was made in visual-haptic judgment. In order to assess similarities and differences in learning to discrimin-



ate among objects haptically and visually, Glinger (1969) conducted parallel experiments in two modalities. Shape and texture were the dimensions chosen, since both of them are relevant to visual and haptic discrimination.

When equally and easily discriminable shapes and textures were used, both kindergartners and third graders learned a visual discrimination problem on the basis of the shapes. Kindergartners learned the haptic discrimination problem on the basis of textures, and third graders learned it on the basis of shapes.

Glinger states that for the haptic modality just as for the visual modality, shape probably provides more information about the identity of objects in the world than does texture. Hence, it was suggested that the older children may come to focus more attention on this more informative dimension and to respond on the basis of it.

The ability to code information cross-modally has been studied in relation to the ability to read. Birch (1964) suggests that "a primary disturbance in the ability to integrate stimuli from the two critical sense modalities, hearing and vision, may well serve to increase the risk of becoming a poor reader." The major finding of Birch's study was that judgments of auditory-visual equivalence were significantly worse in a group of retarded readers than in normal readers. The analyses strongly suggest that the ability to treat visually and auditorily patterned information as equivalent is one of the factors that differentiates good from poor readers.



There have been a few studies only which are of direct relevance to the present study. In a study by Chakravarty (1968) tactual sensitivity of the deaf and hearing was compared. Although there were not many subjects ( $n=16$ ) data revealed that tactual sensitivity of the deaf children was greater than that of the normal hearing children. Also, the tactual sensitivity of the girls was greater than that of the boys.

Another study, Kuo, Shuv Chin et. al., 1968 (cited by Birch 1968) explored the visual and tactual curiosity of deaf and hearing children. The sample consisted of 39 pairs of 2 years 6 months to 7 years 7 months old hearing and impaired hearing subjects. It was found that neither group explored high complexity stimuli longer than medium or low complexity stimuli. Impaired-hearing Ss explored tactual stimuli longer than hearing Ss explored any stimuli. Hearing Ss spent more time exploring visual stimuli than impaired-hearing Ss.

As stated in the opening paragraph of this chapter, the review of the literature yields little experimental evidence that is directly related to the present investigation. An attempt, however, will be made now to pick out the findings that relate most closely to the rationale of our investigation. These are:

1. The failure of earlier studies of the development of sensitivity to facial expression of feeling (Dashiell, 1927; Gates, 1923; Kellogg and Eagleson, 1931 (cited by Davitz, 1964)) to pay sufficient attention to the possibility that the labelling in



## CHAPTER III

### DESIGN OF STUDY

In the Introduction the general ideas underlying the present study were stated. This chapter will now state in specific terms the hypotheses tested, give information on the samples of children, describe the instruments and procedures and indicate statistical procedure used, and in addition make a few comments on the pilot study.

#### Hypotheses

The following hypotheses will be tested:

1. There will be a difference in favour of the hearing in the number of correct responses made in labelling emotions in response to the sound film (see below for details of film).
2. There will be a difference in favor of the hearing in the number of correct responses made to the silent film, but this difference will be less than that found in response to the sound film.
3. There will be no difference in number of correct responses in cross-modal coding tasks between hearing and non-hearing subjects.

#### Sample

Two populations were sampled. The first sample consisted of pupils of the Alberta School for The Deaf, who had hearing parents of average Socio Economic Status and who were between the ages of 8-9, 9-10, 10-11, 11-12,



12-13, and 13-14 years. The second sample were pupils in attendance in an elementary school of the Edmonton Public School Board who also came from average S.E.S. They were between the ages of 9-10, 10-11, 11-12, 12-13, and 13-14 years. 34 subjects from each population were selected.

(While it would have been desirable to have at least twice that number of Ss, it was just impossible to get more deaf children).

The public school was selected on the basis of Kupfer's (1967) sociological survey of the City of Edmonton. Average areas, such as the one from which the average S.E.S. school was selected, are described by Kupfer. These areas have lower proportions of foreign-born and immigrant populations, moderate fertility levels, average educational levels, a preponderance of technical and semi-skilled workers, average income levels, and newer-occupied housing.

Hearing subjects were selected by using the random method of selection of Downie and Heath (1960). A random sample was drawn by use of the table of random numbers, Table XIV, from a stratified random sample. As far as non-hearing subjects are concerned, only a rough estimate of the S.E.S., based on information given by the records, could be made. They were not randomly selected because of the small number available.



As mentioned before, two consecutive studies were carried out. The film "Emergence of Personality", testing ability in labelling emotions was shown and "Dot Patterns" testing cross-modal coding ability were presented. The samples for the first part of this study were initially matched on intelligence by taking both hearing and non-hearing subjects from the same quartile of the norms for Progressive Matrices, although the non-hearing Ss were a year to a year and a half older. For the subsequent experiment a third group of Ss matched on age were added. A closer analysis of the Progressive Matrices were carried out after obtaining the results. This is presented in Table 1. It is apparent that although the groups occupied broadly the same range of percentiles, on detailed examination of raw scores, the non-hearing group had generally higher scores than the hearing. They were also older, which indicates consistency.

Table I

## Scores of Raven's Progressive Matrices

Group	H8-9	NH10-11 yrs.	H10-11	NH12-13 yrs	H12-13	NH14-15 yrs
Mean	31.1	34.5	34	39	38	41
St Dev	3.31	3.74	2.23	2.82	1.00	2.64
T		2.26		3.54		2.00
P		<.02		<.001		<.10

See app. B for range of raw scores.



## Instrumentation

Apart from the Progressive Matrices already referred to in the section on sampling, two instruments were employed in this investigation.

A film entitled *Emergence of Personality*, shown to both hearing subjects and non-hearing subjects; Tactual Tap-Patterns, a test of cross-modal coding tasks.

From the film and structured interview, rated by 3 judges, the Ss were required to express in writing their perception of emotions portrayed by actors in the film.

The film was chosen because according to research literature (Landis, 1929) it is practically impossible to name accurately the emotion being experienced by a subject if the total situation is not known. Langfeld (1918) also states that there is more difficulty involved to derive emotions from the facial expression alone than to recognize the expression once the situation is known. Selection of sequences in the film were made by a group of judges. Sequences that had a low reliability of agreement were eliminated. The basis of selecting the sequences was diversity of emotions represented and relative ease of interpretation of emotions.

Each pre-designated sequence shows an emotion which the subject identifies by answering the question, "How does the person feel in the picture?" If more than one person



appears in the picture, the experimenter indicates whose expression is to be judged. Sequences are charted under the following categories; 1. child situation, 2. child-adult situation, 3. child-child situation, 4. adult situation (see app. A). Responses written by subjects were given to three independent judges who use a syllabus for classification under 1. correct 2. incorrect.

The Tactual tap-patterns test is a modified form from "Auditory Tap-Patterns-Visual Stimuli" which Birch (1964) used with normal and retarded readers. Whereas Birch's test involved the auditory and the visual mode, the test used here, involved the tactual and the visual mode.

As naturalistic a situation as possible was provided for these subjects when the film was shown. 17 hearing and 17 non-hearing were shown the film with sound. The age groups of the non-hearing were 10-11 years, 12-13 years and 14-15 years. The age groups of the hearing were 8-9 years, 10-11 years, and 12-13 years. A week later, out of the 34 subjects, 8 from each group (hearing 3 8-9, 3 10-11, and 2 12-13 year olds; non-hearing 3 10-11, 3 12-13, and 2 14-15 year olds) were taken and shown the film without sound. By removing the sound an atypical situation was provided for the hearing and a less atypical for the non-hearing. Consequently, differences in perception between hearing and non-hearing could be magnified in this situation. It should also indicate whether or not non-hearing and hearing variables are causing differences in perception. These same groups



were tested for the cross-modal tasks and to test the validity of the data from this testing on cross-modal tasks, an additional 17 Ss from each population was tested. These additional 17 Ss were hearing Ss 9-10 yrs., 11-12 yrs., 13-14 yrs., non-hearing 9-10 yrs., 11-12 yrs., and 13-14 yrs., of age. Rather than have the non-hearing be a year ahead of the hearing, they were matched age for age. This was done to explore further the superiority of the deaf on cross-modal tasks when these were 1 to 1½ yrs. older than the hearing. Having these Ss the same age would indicate from the results whether the non-hearing, matched for chronological and for scores on the Raven's Progressive Matrices test, were truly superior to the hearing in coding cross-modally.

#### Statistical Procedure

For the purpose of this study, data were analysed by the use of charts showing mean, standard deviation and variance, and the sign test. Each hypothesis is discussed according to statistical significance.

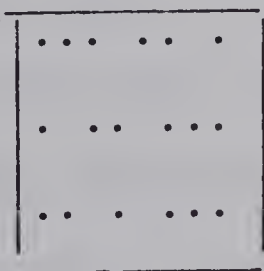
#### Pilot Study

A pilot study was conducted with 15 subjects from the school for The Deaf, and 17 subjects from school in the Edmonton Public School Board and of average S.E.S. The study provided direction in terms of methods of observation and scoring or responses of non-hearing and hearing children. Changes that became necessary are discussed in this chapter.

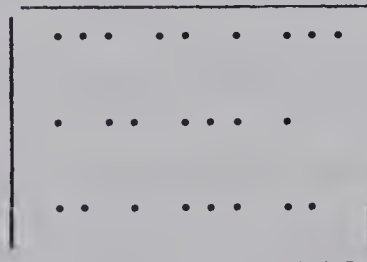


During the pilot study any interpretational response which expressed the general trend of feeling in the picture was counted as correct. However this was found to be inadequate because NH children tended to ignore the feeling in their descriptions. It became necessary to distinguish between descriptions to see if some recognition of emotion existed. This was particularly necessary with non-hearing children. Therefore responses were counted correct only if the Ss in their explanations had the right word for the emotion. (e.g. sad, happy, love).

The tactual-visual tasks were too easy on first trial. Therefore the difficulty level was increased. This was done in two ways: 1. the time interval between tapping on the palm of the hand and the S's choice of visual pattern was increased from 15 seconds to 1 minute. 2. The dotted patterns on each card were increased from three to four. e.g. instead of



the card would be





## CHAPTER IV

### RESULTS

The first hypothesis was that there would be a difference in favor of the hearing in the number of correct responses made in labelling emotions in response to the sound film.

To get necessary data, the responses of all the Ss in each age group were totalled. The mean, variance, and standard deviation for each group appears in "Table I", and "Table II" indicates the significance of the differences in labelling responses to the sound film (sign test used). It will be noted in table II, that the computed  $x^2$  is more than the critical  $x$ .

The second hypothesis stated that there will be a difference in favor of the hearing in the number of correct responses made to the silent film, but this difference will be less than that found in response to the sound film.

The responses of all the Ss were totalled and the mean, variance, and standard deviation for the hearing and non-hearing were computed and appear in Table III, and Table IV indicates the significance of the differences (sign test used).

Our third hypothesis stated that there will be no significant difference in the number of correct responses in cross-modal coding tasks.

The responses of all the Ss in each age group were



totalled. The mean, variance, and Standard deviation for each group was computed and appear in Table V and Table VI indicates the significance of the differences (sign test used).

In part I of Table VI, the computed  $X^2$  is more than the critical  $X$ , therefore there is a significant difference in the number of correct responses in cross-modal tasks in favor of the non-hearing. In part 2 of Table VI, the computed  $X^2$  is less than the critical  $X$ , therefore there is no significant difference between the hearing and non-hearing when the same chronological age.

#### Summary of Results

The conclusions which appear warranted on the basis of this study are:

1. There is a significant difference ( $P < .02$ ) in favor of the hearing age 8-9 and 10-11 years, as compared to the non-hearing age 10-11 and 12-13 years in response to the sound presentation of the film. There is no difference between non-hearing aged 14-15 yrs., and hearing aged 12-13 yrs.
2. There is no significant difference between the performance of the hearing and non-hearing to the silent presentation of the film, though the difference ( $P < .20$ ) appears in the expected direction, viz. in favor of the hearing.
3. In cross-modal coding tasks, there is a significant difference between the performance of the hearing and non-hearing of the age groups as above, in favor of the non-hearing. There is no significant difference when hearing and non-hearing are the same chronological age.



TABLE I  
NUMBER OF CORRECT LABELLING RESPONSES TO SOUND FILM

Age Group	H 8-9 yrs	NH 10-11 yrs	H 10-11 yrs	NH 12-13 yrs	H 12-13 yrs	NH 14-15 yrs
Mean	8.2	4.3	10.6	5	12.6	9.3
Variance	8.4	5	9.6	5.6	2	10.5
St. Dev.	2.8	2.2	3.0	2.3	1.4	3.2
N	8	8	6	6	3	3



TABLE II

## SIGNIFICANCE OF DIFFERENCES IN LABELLING RESPONSES TO SOUND FILM

Age Group	H 8-9 + NH 10-11 yrs	H 10-11 + NH 12-13 yrs	H 12-13 + NH 14-15 yrs
$\chi^2$	6.60	5.40	1
P	<.02	=.02	<.30

For the two younger age groups compared, the computed  $\chi^2$  is more than critical X, therefore there is a significant difference between the hearing and the non-hearing in favor of the hearing Ss. The hypothesis can be regarded as confirmed.



TABLE III

## NUMBER OF CORRECT LABELLING RESPONSES TO SILENT FILM

Group	Hearing	Non-hearing
	(Ages: 8-13 yrs)	(ages:10-15 yrs)
Mean	8.7	5.7
Variance	11.1	14
St. Dev.	3.3	3.7
N	8	8

TABLE IV

SIGNIFICANCE OF DIFFERENCES IN LABELLING RESPONSES TO SILENT  
FILM TASKS

Group	Hearing	+	Non-hearing
$\chi^2$		2.4	
P		<.20	

The computed  $\chi^2$  is less than critical  $\chi$ , therefore there is no significant difference in labelling emotions to silent film tasks between sample I & II. However, it should be noted that the difference is in the expected direction.



TABLE V  
NUMBER OF CORRECT RESPONSES IN CROSS-MODAL TASKS

Group	H 8-9	NH 10-11 yrs.	H 10-11	NH 12-13 yrs.	H 12-13	NH 14-15 yrs.
Mean	11.7	15.7	15	23.8	26.6	28.3
Variance	28.2	13	45.2	11.4	25	8.5
St. Dev.	5.2	3.6	6.7	3.3	5	2.9
N	8	8	6	6	3	3
	H 9-10	NH 9-10 yrs	H 11-12	NH 11-12 yrs.	H 13-14	NH 13-14 yrs.
Mean	11.8	12.2	16.5	19.1	27.3	28
Variance	30	26	25.4	28	10	3
St. Dev.	5.4	5.0	5.0	5.2	3.1	1.7
N	8	8	6	6	3	3



TABLE VI

## SIGNIFICANCE OF DIFFERENCES IN CROSS-MODAL TASKS

Group	H 8-9 + NH 10-11 yrs.	H 10-11 + NH 12-13 yrs.	H 12-13 + NH 14-15 yrs.
$\chi^2$	4.06	8	.66
P	<.05	<.01	<.50
Group	H 9-10 + NH 9-10 yrs.	H 11-12 + NH 11-12 yrs.	H 13-14 + NH 13-14 yrs.
$\chi^2$	.20	.37	.1
P	<.50	<.50	<.70



## CHAPTER V

### 1. DISCUSSION AND IMPLICATIONS

#### a) Discussion

In labelling emotions in response to sound film presentation, results show the hearing to be superior to the non-hearing in spite of the fact that the deaf children were a year or more older and had higher scores (hence higher mental ages) than their normal comparison group. Although this is contrary to the lay-man's notion that deaf children are more sensitive to affective states, and hence the perception and labelling of emotions than hearing children, the non-hearing children were obviously not able to compensate sufficiently for their lack of auditory and verbal cues.

In relation to the second hypothesis the range of cues were equalized for non-hearing and hearing children (with the hearing perhaps at a disadvantage as regards cues because they were less accustomed to such elimination of the auditory cues). Under these conditions we had expected the difference in scores between non-hearing and hearing to be reduced though not eliminated, because the deficit in the ability to label would still exist for the non-hearing. The results were only in the expected direction, but did not reach an acceptable level of statistical significance.

Considering, however, that the non-hearing were older than the hearing, and had higher raw scores on the intelligence test, it seems reasonable to assume that with child-



ren matched for chronological age and mental age the difference in scores would have been more marked, and probably would have become statistically significant. Therefore, we can state that the deficit in ability to label seems to play a role in depressing the scores of the non-hearing. But we cannot assert this with certainty. The results of the cross-modal coding throws some light on this however. The results indicated that the same non-hearing Ss who had been clearly inferior to the hearing Ss in response to the sound film presentation, and certainly not superior to the hearing Ss on the silent film presentation, were markedly superior in their performance in the corss-modal task. Since the cross-modal task did not require labelling, this lends support to the view that the deficit in labelling may have been a strong factor in lowering the scores in the identification of emotions tasks.

The finding of the superiority of the older non-hearing Ss over the 1 to 1½ years younger hearing Ss on the cross-modal task were unexpected. Looked at superficially it would have been taken to mean that the non-hearing do indeed compensate for their auditory deprivation. The superiority of non-hearing in this particular group can, however be accounted for more readily by the fact that their raw scores on Raven's Progressive Matrices, although falling within the same percentile range, were actually higher than those of the hearing. When hearing and non-hearing were



matched age for age, and the mental ages were almost identical the non-hearing were not significantly superior. However, they were not inferior either. Therefore, it seems reasonable to state that the non-hearing can code information providing the task does not involve vocabulary.

When a task involves vocabulary and the child is expressing in language what he is sensing, we cannot be sure that the very act of labelling may not be affecting that which he is experiencing. Because it is required that hearing and non-hearing express feeling in written form, the written statement may not be reflecting accurately the feeling experienced. Mere writing may force a conceptualization beyond the original experience of viewing the film clip. If the feeling is changed because of the writing task, this may affect the non-hearing more than the hearing.

### Significance of the Study

It is essential that teacher-pupil communication be at the highest level possible. Through this study we can get further clarification as to the ways emotions are communicated and interpreted by deaf children. Furthermore, we can get further information on how these children code when verbal responses are not required. If the non-hearing learn by different methods than the hearing, the training of teachers may have to differ somewhat, e.g. teachers may have to be trained to be much more overtly expressive than is necessary for teachers of the hearing.



### Research Implications

Further research should be done to test the lay-man's notion that deaf children are more sensitive to affective states because of sensory compensation or use of another sense modality other than hearing. It should be pointed out that this study had a limited sample of non-hearing subjects and in order that this study be replicated it would be necessary to select Ss from several schools for the deaf thereby increasing N of the sample. Also it may be profitable to do this study by use of a video-tape which would enable the experimenter to capture the "reacting to" emotions of the subject. This Video would provide the experimenter with information which he could later analyze by viewing several times over.

### Educational Implications

The findings of this study, particularly the results of the cross-modal coding task, underlines the need to heed the warning of Furth that we should not assume that language deficits immediately reduce cognitive performance of every kind; we should explore the strengths of the non-hearing and see how we can capitalize on them. At the same time we should develop the child's verbal abilities as far as possible.



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## APPENDICES



APPENDIX A

FILM SEQUENCES CHARTED



Situational	Child-Adult	Child-Child	Child	Adult
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Context

1. Young man appears on screen smiling.

2. Mother plays and fondles infant child tenderly.

3. Baby gazes over mother's shoulder and smiles after being burped.

4. Baby lies in crib playing and smiling.

5. Baby in crib smiling, sticks tongue out. Mother tends to baby.

6. Father picks baby up and plays with it.

7. Girl on bed with baby. Girl cuddles baby, then kisses it.

8. Boy wrings his hands against his face and smiles as his eyes twinkle.

9. Boy pulls girl's hair because she refuses to give him her toy.

10. Little girl carries big rocking chair, drops it on the floor and begins to cry.



Situational	Child-Adult	Child-Child	Child	Adult
Context				

11. Girl is  
picked up by  
mother and  
comforted after  
falling down  
2 stairs.

12. Girl  
looks at  
toy counter  
then she  
turns away.  
Her face is  
long and sad.

13. Boy  
pushes girl  
over in  
play yard.

14. Boy and  
girl fight  
over block.

15. Boy and  
girl fight  
over teddy  
bear.

16. Boy Plays  
at water foun-  
tain and  
splashes his  
face then  
smiles.

17. Little  
girl sits on  
chesterfield  
hugs her doll  
and smiles.

18. Brother and  
sister play to-  
gether, then  
father takes  
boy outside for  
boxing. Girl  
is left alone.  
She looks at them  
with her head  
down.



APPENDIX B

RAW SCORES OF RAVEN'S PROGRESSIVE MATRICES



# Raw Scores of Raven's Progressive Matrices

I

II

Group	Hearing	8-9 yrs.	10-11 yrs.	12-13 yrs.	9-10 yrs.	11-12 yrs.	13-14 yrs.
Scores	26		32		29	37	37
	28		34	37	31	34	39
	30		35	38	31	35	40
	30		36	39	32	35	
	32		36		33	36	
	32		38		33	37	
	35				33		
	36				34		

I  
Non

II

Group	Hearing	10-11 yrs.	12-13 yrs.	14-15 yrs.	9-10 yrs.	11-12 yrs.	13-14 yrs.
Scores	26		36	39	30	35	38
	34		36	40	30	35	38
	34		38	44	30	36	39
	35		40		31	36	
	36		41		32	37	
	36		43		33	38	
	37				33		
	38				34		





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